

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte BARNEY M. COHEN, SURAJ RENGARAJAN, XIANGBING LI,  
KENNY KING-TAI NGAN and PEIJUN DING

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Appeal No. 2005-0923  
Application No. 09/388,989

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HEARD: JULY 12, 2005

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MAILED

JUL 28 2005

U.S. PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS  
AND INTERFERENCES

Before GARRIS, PAK and JEFFREY T. SMITH, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal which involves claims 1, 3, 4, 6, 8-14, 17-23 and 33.<sup>1</sup>

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<sup>1</sup>At the July 12, 2005 Oral Hearing for this application, the appellants' attorney Mr. Tackett pointed out with admirable candor that dependent claims 3 and 8 fail to further limit the parent claims from which they depend. This failure violates 37 CFR § 1.75(c). Therefore, upon return of the application to the jurisdiction of the examiner, the appellants and the examiner should address and rectify this claim informality.

Appeal No. 2005-0923  
Application No. 09/388,989

The subject matter on appeal relates to a method for improving metal deposition on a patterned dielectric layer comprising cleaning the layer with a first plasma consisting essentially of argon, then cleaning the layer with a second plasma consisting essentially of hydrogen and helium, and then depositing a metal on the patterned dielectric layer. This appealed subject matter is adequately represented by independent claim 1 which reads as follows:

1. A method for improving metal deposition on a patterned dielectric layer, comprising:

a) cleaning the patterned dielectric layer in a processing chamber with a first plasma consisting essentially of argon;

b) cleaning the patterned dielectric layer in the processing chamber with a second plasma consisting essentially of hydrogen and helium after cleaning the patterned dielectric layer with the first plasma; and

c) depositing a metal on the patterned dielectric layer after exposing the dielectric layer to the first plasma and the second plasma.

The references set forth below are relied upon by the examiner as evidence of obviousness:

Yoo et al. (Yoo)	5,203,957	Apr. 20, 1993
Yamazaki (published Japanese Kokai Patent Application)	56-155526	Dec. 1, 1981

Appeal No. 2005-0923  
Application No. 09/388,989

All of the appealed claims are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoo in view of Yamazaki.

This rejection cannot be sustained.

As the examiner fully appreciates (see page 4 of the answer), appealed independent claim 1 (as well as the other independent claims on appeal) distinguishes from Yoo by requiring a second plasma consisting essentially of hydrogen and helium whereas the second plasma of Yoo's process comprises helium and a fluorocarbon. Concerning this distinction, the examiner points out that Yamazaki teaches cleaning a semiconductor substrate with a plasma of hydrogen and helium (see the paragraph bridging pages 4 and 5 of the answer). The examiner then reaches an obviousness conclusion which is expressed on page 5 of the answer as follows:

It would have been obvious to one of ordinary skill in the art to employ the active reduction gas  $H_2$  in the process of Yoo . . . , because Yamazaki . . . shows the  $H_2+He$  plasma is analogously used to prepare insulating [sic] surfaces for metal deposition, where like metal may be deposited (Yoo . . . , column 5, lines 14-23, Ti, TiW, Al), so one of ordinary skill would have expected effective equivalent results, with the deposition surfaces noted to have been activated for the metal deposition by the  $H_2+He$  plasma treatment thus providing further motivation, since metallization of insulating surfaces is a goal of Yoo . . . , and as the process is taught to work for cleaning insulating or semi-insulating (i.e., semi-conducting) or Si as in claim 3 or page 4, its effectiveness for cleaning and preparing both the dielectric and the exposed underlying Si substrate in Yoo . . . is demonstrated.

Appeal No. 2005-0923  
Application No. 09/388,989

This obviousness conclusion is improper. It is true that Yamazaki teaches cleaning a substrate with a plasma of hydrogen and helium in order to remove impurities such as the OH group, water and oxygen that are absorbed on the substrate (e.g., see pages 2 and 3 of the Yamazaki translation). It is critical to appreciate, however, that Yoo's plasma of fluorocarbon and helium performs a reactive ion etching function for removing a thin layer of silicon surface (e.g., see lines 3-8 in column 5). The record before us militates against rather than for a reasonable belief that Yoo's desired etching function would be performed by a hydrogen and helium plasma of the type taught by Yamazaki and required by the appellants' independent claims. We are compelled by this circumstance to regard the Yoo and Yamazaki references as failing to provide the requisite suggestion, based on a reasonable expectation of success, for the combination proposed by the examiner. See In re O'Farrell, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1680-81 (Fed. Cir. 1988).

In summary, the examiner has failed to carry his burden of establishing a prima facie case of obviousness within the meaning of 35 U.S.C. § 103(a). See In re Oetiker, 977 F.2d 1443, 1445,

Appeal No. 2005-0923  
Application No. 09/388,989

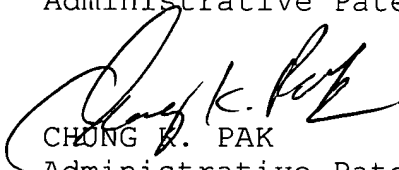
24 USPQ2d 1443, 1444 (Fed. Cir. 1992). We hereby reverse,  
therefore, the Section 103 rejection of all appealed claims as  
being unpatentable over Yoo in view of Yamazaki.

The decision of the examiner is reversed.

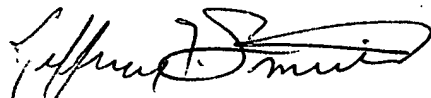
REVERSED



BRADLEY R. GARRIS  
Administrative Patent Judge



CHUNG K. PAK  
Administrative Patent Judge



JEFFREY T. SMITH  
Administrative Patent Judge

BOARD OF PATENT  
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BRG/hh

Appeal No. 2005-0923  
Application No. 09/388,989

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